

REMARKS**I. Introduction**

At the time of the Office Action dated March 7, 2006, claims 1, 2, 4-12 and 14-23 were pending in this application. All the claims stand rejected.

In this Amendment, claims 1 and 11 have been amended, and claims 22 and 23 have been canceled. Care has been exercised to avoid the introduction of new matter. Specifically, claims 1 and 11 have been amended only for clarification. In more detail, these claims have been amended to replace the recitation “at the time of plasma processing” with --during the plasma processing--. Adequate descriptive support for this amendment can be found on, for example, page 18, lines 12-13 of the specification, which reads “the film-forming processing causes a sharp temperature gradient across the plasma chamber 107.” Applicants, therefore, submit that the present Amendment does not generate any new matter issue or any new issue for that matter and, hence, solicit entry pursuant to the provisions of 37 C.F.R. §1.116.

II. The Rejection of Claims 1, 2, 4-12 and 14-23 under 35 U.S.C. §112, second paragraph

In the statement of the rejection, the Examiner asserted that “the recitation in independent claims 1 and 11 of ‘a plurality of pieces formed in relation to a distribution of temperatures in the... chamber at a time of plasma processing,’ and the recitation that ‘each of the plurality of pieces is shorter in axial length than a piece disposed at a location where a gradient of the temperatures at the time of the plasma processing is smaller’ render the claims indefinite.

It is noted that Applicants has amended independent claims 1 and 11 to replace the recitation “the time of plasma processing” with --during the plasma processing-- for clarification, as set forth above.

In more detail, the Examiner asserted that the distribution of temperatures in the plasma and or sample chamber, and the distribution of temperature gradients, may vary in the claimed apparatus, depending, for example, on the presence and use of additional structural components (i.e. heaters; the presence of conduit putting the sample chamber in communication with the plasma chamber) (“**factor 1**”), the type of processing performed using the apparatus, environmental factors (“**factor 2**”), or the length of time processing has already been performed up to the point referred to as “the time of plasma processing (“**factor 3**”).

With respect to **factor 1**, Applicants submit that it is apparent for persons skilled in the art that once the protection tube is secured in the plasma chamber or the sample chamber, neither the plasma chamber nor the sample chamber is opened. Thus, the plasma processing apparatus does not undergo any structural change, such as addition or change of any components.

For **factor 2**, Applicants stress that even if it is assumed that the temperature distribution and gradient vary depending on the type of processing performed by an apparatus and environmental factors, the relation between any given two locations in the plasma chamber or the sample chamber does not change in terms of magnitude of the temperature gradient. That is, there will be no change as to whether the temperature gradient increases or decreases at one of the locations relative to that of the other location.

As to **factor 3**, it is noted that, irrespective of change in the length of time processing having already been performed up to the “time of plasma processing,” there will be no change in

the relation between any given two locations in the plasma or sample chamber in terms of magnitude of the temperature gradient.

Furthermore, the plasma processing apparatus generates a magnetic field within the plasma chamber filled with a gas such as argon, so that a discharge occurs by electronic cyclotron resonance. As a result, a high-density plasma is generated, and argon ions are subsequently generated. Since the thus generated plasma reaches extremely high temperatures, there is a steep temperature gradient in proportion to the plasma gas distributed within the plasma chamber. A plasma processing apparatus is designed to achieve a specific plasma gas distribution suitable for plasma processing. Accordingly, at the time of designing the plasma processing apparatus, those skilled in the art are able to specify the temperature gradient that would occur during the plasma processing.

Accordingly, the recitations identified by the Examiner are not indefinite for persons skilled in the art. It is noted that the rejection of claims 22 and 23 has been rendered moot by cancellation of the claim. Applicants, therefore, solicit withdrawal of the rejection of claims 1, 2, 4-12 and 14-21 and favorable consideration thereof.

III. The Rejection of Claims 1, 2, 6-8 and 22 under 35 U.S.C. §103(a)

Claims 1, 2, 6-8 and 22 have been rejected under 35 U.S.C. §103(a) as being unpatentable over Applicants' Admitted Prior Art (AAPA) in view of Carpenter et al. It is noted that the rejection of claim 22 has been rendered moot by cancellation of the claim.

In response, Applicants stress that the applied combination of the AAPA and Carpenter et al. does not disclose or suggest a plasma processing apparatus including all the limitations recited in independent claim 1. Specifically, the applied combination does not teach, among

other things, that the protection tube comprises “a plurality of pieces formed in relation to a distribution of temperatures in the plasma chamber,” and “each of the plurality of pieces is shorter in axial length than a piece disposed at a location where a gradient of the temperatures at the time of the plasma processing is smaller,” as recited in independent claim 1. These limitations structurally define a plasma processing apparatus in which the axial length of each piece of the protection tube is defined by the gradient temperatures of the chamber during the plasma processing.

Turning to the prior art, as admitted by the Examiner, the AAPA does not teach the protection tube recited in independent claim 1. Carpenter et al. teaches a protection tube (e.g., liner) that is composed of a plurality of pieces. However, the protection tube is divided into a plurality of pieces simply for the sake of ease in liner replacement. Carpenter et al. is silent on damage of the protection tube resulting from the temperature gradient caused during the plasma processing. Carpenter et al. fails to teach providing a protection tube composed of a plurality of pieces, each of which has a length defined in accordance with the temperature gradient, as claimed.

In addition, the claimed invention provides a significant benefit that breakage of the protection tube is prevented. This benefit is not provided and even taught by the applied combination of the AAPA and Carpenter et al.

In paragraph 8 of the Office Action, the Examiner responded to Applicants’ arguments regarding *Ex parte Masham*. In that paragraph, the Examiner stated that “the Examiner responds that contrary to Applicant’s assertion that *Ex parte Masham* is only relevant to the material worked on by an apparatus, *Ex parte Masham* also addresses the issue of intended use or functional language in apparatus claims.” The Examiner continued to assert that “[i]t was held

that a claim containing a ‘recitation with respect to the manner in which a claimed apparatus is intended to be employed does not differentiate the claimed apparatus from a prior art apparatus’ if the prior art apparatus teaches all the structural limitations of the claim” (emphasis added). It is noted that Applicants did not argue that “*Ex parte Masham* is only relevant to the material worked on by an apparatus.”

Applicants emphasize that because the applied combination of the cited references does not teach all the structural limitations of the claim for the reasons set forth above, *Ex parte Masham* is distinguishable from the pending rejection. Applicants, again, respectfully invite the Examiner’s attention to the claimed limitation “each of the plurality of pieces is shorter in axial length than a piece disposed at a location where a gradient of the temperatures during the plasma processing is smaller.” This limitation structurally defines a plasma processing apparatus, which is entitled to be given patentable weight. The Examiner should explain why this claimed limitation is not structurally defined. The Examiner did not clarify any underlying facts, based on which *Ex parte Masham* is applied.

As discussed above, since the claimed invention, structurally defines limitations regarding the plurality of pieces, which is not taught or suggested by the applied combination, *Ex parte Masham*, the present invention is clearly distinguishable from the prior art. Again, *Ex parte Masham* is applicable if the prior art apparatus teaches all the structural limitations of the claim.

Based upon the foregoing, Applicants submit that the applied combination of the AAPA and Carpenter et al. does not disclose or suggest a plasma processing apparatus including all the limitations recited in independent claim 1, as amended, even if the combination of the AAPA and Carpenter et al. are assumed to be proper for the sake of this response. Dependent claims 2

and 6-8 are also patentably distinguishable over the AAPA and Carpenter et al. at least because they respectively include all the limitations recited in independent claim 1. Applicants, therefore, respectfully solicit withdrawal of the rejection of claims 1, 2 and 6-8 under 35 U.S.C. §103(a) and favorable consideration thereof.

IV. The Rejection of Claims 4 and 5 under 35 U.S.C. §103(a)

Claims 4 and 5 have been rejected under 35 U.S.C. §103(a) as being unpatentable over the AAPA in view of Carpenter et al. and further in view of Carducci et al.

In response, it is submitted that the applied combination does not teach or suggest a plasma processing apparatus including all the limitations recited in claims 4 and 5, at least because these claims include all the limitations recited in independent claim 1. Applicants specifically note that Carducci et al. does not teach the protection tube recited in claim 1, and thus, does not cure the deficiency of the applied combination of the AAPA and Carpenter et al.

Accordingly, the claimed invention would not have been obvious, and withdrawal of the rejection of claims 14 and 15 is respectfully solicited.

V. The Rejection of Claims 9-12, 16-21 and 23 under 35 U.S.C. §103(a)

Claims 9-12, 16-21 and 23 have been rejected under 35 U.S.C. §103(a) as being unpatentable over the AAPA in view of Carpenter et al., and further in view of Kennedy et al. It is noted that the rejection of claim 23 has been rendered moot by cancellation of the claim.

With respect to independent claim 11, Applicants submit that the applied combination of the AAPA, Carpenter et al. and Kennedy et al. does not disclose or suggest, among other things, the axial length of each piece of the protection tube which is defined by the gradient

temperatures of the chamber during the plasma processing (see, the discussion on the rejection of independent claim 1). Specifically, Kennedy et al. teaches a plasma processing chamber including a protection tube (e.g., ceramic liner). However, Kennedy et al. fails to teach possible damage of the protection tube due to the temperature gradient that would occur during the plasma processing. In addition, Kennedy et al. fails to teach providing a protection tube composed of a plurality of pieces each having a length defined in accordance with the temperature gradient.

Accordingly, the applied combination of the AAPA, Carpenter et al. and Kennedy et al. does not disclose or suggest all the limitations recited in independent claim 11. Dependent claims 9, 10, 12 and 16-21 are also patentably distinguishable over the AAPA, Carpenter et al. and Kennedy et al. at least because those claims respectively include all the limitations recited in independent claims 1 and 11. Applicants, therefore, respectfully solicit withdrawal of the rejection of claims 9-12 and 16-21 under 35 U.S.C. §103(a) and favorable consideration thereof.

VI. The Rejection of Claims 14 and 15 under 35 U.S.C. §103(a)

Claims 14 and 15 have been rejected under 35 U.S.C. §103(a) as being unpatentable over the AAPA in view of Carpenter et al., and further in view of Kennedy et al., and further in view of Carducci et al.

In response, it is submitted that the applied combination does not teach or suggest a plasma processing apparatus including all the limitations recited in claims 14 and 15, at least because they include all the limitations recited in independent claim 11. Applicants note that Carducci et al. does not teach the protection tube recited in claim 11, and thus, does not cure the deficiencies of the applied combination of the AAPA, Carpenter et al. and Kennedy et al.

Accordingly, withdrawal of the rejection of claims 14 and 15 is respectfully solicited.

VII. Conclusion

It should, therefore, be apparent that the imposed rejections have been overcome and that all pending claims are in condition for immediate allowance. Favorable consideration is, therefore, respectfully solicited.

To the extent necessary, a petition for an extension of time under 37 C.F.R. 1.136 is hereby made. Please charge any shortage in fees due in connection with the filing of this paper, including extension of time fees, to Deposit Account 500417 and please credit any excess fees to such deposit account.

Respectfully submitted,

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WDC99 1241331-1.067471.0033